ELECTRONIC CONTROLLER SYSTEM

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ABSTRACT

Technologies of remote access have been effectively used in various fields of engineering for a long period of time. Network communications have made the technology of remote access available for a great deal of applications. Remote access can be used in practice - control and monitoring of electric and electronic devices, whereby an operator can control the device at a distance and get back a response with experimental data. This project is to design and develop a prototype of electronic controller system that has facilities such as lighting, Air-conditioner and Security System (CCTV. All these facilities will be controlled either by software setting or manually controlled in case there are system malfunction in auto mode. Signals from all these facilities will be fed into appropriate controller and then will be sent to server for data processing using parallel port cable. Server will be remote by client in other place to control the ECS application in the same of local area network (LAN).

ABSTRAK

Teknologi "remote access" telah digunakan dalam pelbagai bidang untuk jangka masa yang panjang dengan berkesan. Prinsip dan unsur-unsur baru telah diperkenalkan untuk menrealisasikan "remote access" dengan menaik taraf teknologi maklumat dan telekomunikasi di dalam komputer peribadi, rangkaian komunikasi. Jaringan komunkasi telah membuat teknologi "remote access" mempunyai banyak aplikasi. Ia boleh digunakan dalam kawalan dan pemantauan elektrik dan perantik elektronik dimana pengguna boleh mengawal peranti pada jarak jauh dan mendapatkan kembali respon dengan berjayanya. Projek ini dicipta dan dihasilkan adalah untuk mengeksplotasikan sistem pengawalan elektrik yang mengandungi kemudahan seperti lampu, penghawa dingin dan sistem keselamatan (penggera dan sistem kamera litar tertutup. Semua kemudahan ini akan dikawal oleh perisian yang telah diset operasinya atau kawalan secara sendiri (manual) sekiranya sistem tidak operasi dalam keadaan automatik. Isyarat dari semua kemudahan akan dibaca oleh pengawal yang sesuai (Input/output Module Interface Circuit) dan kemudiannya akan menghantar isyarat tersebut ke pelayan utama(Server) untuk proses data menggunakan kabel pelabuhan selari. Server akan di kawal dengan menggunakan teknologi "remote access" oleh pengguna (client) yang berada di lokasi yang berasingan tetapi dalam satu network yang sama (LAN).

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Electronic Controller System is a prototype application developed for controlling electronic devices by using remote access application and to perform technical solution on controlling devices using internet instruction. This application develop by using a methodology that called as System Development Life Cycles (SDLC) that's include six (6) phase that are project identification and selection, project initiation and planning, analysis requirement, system design, implementation and system testing. The tools that used in develop this system are Microsoft Visual Basic 6.0 to design interface and develop the system, Input/output Module Interface Circuit are the hardware that will used by a server to control electronic device. One of the most commonly used applications for remote control systems involves client-server. The server controls the client that is electronic equipment by using a Input/output Module Interface Circuit and handles all requests from the user side. The other tools are a Microsoft Office for documentation includes Gantt chart and flow chart

1.2 Problem Statement

i. Careless to switch off all the electrical facilities like lamp, air-conditioner, and others is the factor of this problem

ii. Lack of equipment facilitates to control electricity wastages and manage electronic equipment.

1.3 Objective

The objectives of this project are:

i. To develop a prototype for controlling electronic devices by using client server application.

ii. To perform technical solution on controlling devices using internet instruction.

1.4 Scope

The scopes of this project are:

i. This system will be used by staff JPPH to manage electronic equipment like an air conditional and lamp in lecture room.

ii. The electronic controller system is not the alert system, it just control and power off the electronic equipment.

iii. This system will consist of a monitoring function where controlling an electronic equipment will done based on the remote access and implemented in Windows environment.

iv. This client server application developed by using Microsoft Visual Basic 6.0

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter will explain about the research and analysis that had in carried out to develop an application electronic controller via client server. Researcher had explored two current systems which possess some similarities with this system and the technology of integrated circuit namely IC ULN2803 that will used to develop an application of electronic controller system. This chapter also elucidate by detail what is client server and remote access, explain about the software will be used and the advantage by using this software to develop an application Electronic Controller System.

2.2 Current System

There are 2 existing systems regarding to this project that has been explored.

i) Performing Experiment by Remote Control Using the Internet.

ii) Radio Electronic Device Control and Monitoring Via Internet

2.2.1 Performing Experiment by Remote Control Using the Internet.

This system was developed two years ago in which students could perform experiments by remote control via the Internet. The prototype enabled students in a laboratory in Liverpool in England, United Kingdom, to perform experiments using equipment that was in a laboratory located in Wismar, Germany. [1].Similarly, students in Germany were able to control equipment in a laboratory in the UK. [1].Although the prototype system was successful; it required the use of specialist software both in the laboratory in which the equipment was being controlled and at the client site where the students were located. [1]

Furthermore, the students could not see the actual equipment; all they could see were mimic diagrams and virtual instruments. [1]. A more sophisticated arrangement has since been developed which only requires specialist equipment at the site where the equipment is located.[1] At the client site all that is required is a version of the Netscape browser that can accept JavaScript. [1]. Furthermore, a facility has been added which creates a window on-screen at the client PC through which the experiment can be viewed directly by means of a camera attached to the server (see Figure 2.1). [1]

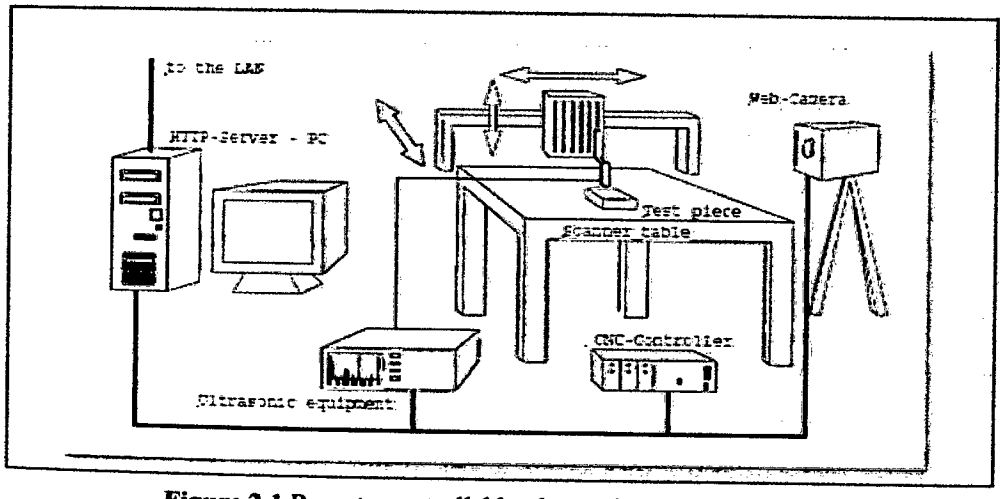

Figure 2.1 Remote-controllable ultrasonic measuring equipment

2.2.2 Radio Electronic Device Control and Monitoring Via Internet

This system was developed to control and monitoring radio electronic by using internet. Remote access to radio electronic devices and systems via telecommunication channels enables to control and monitoring their characteristics in the cases when a presence of an operator just near the appliances is impossible due to number of reasons. [2]. It makes possible to measure a wide set of electrical characteristics of devices at a distance via internet. [2].This technology might be important for researchers from collaborative work point of view. It might also provide them with an opportunity to run an experiment on unique equipment they cannot get at their disposal. [2]

There are two variants of remote access, which can be used in practice-control and monitoring. [2].The first variant means that an operator can control the device at a distance and get back a response with experimental data. In case it is necessary to use client/server software, the general structure of which is shown in figure 2.2 and 2.3.

For some types of devices multi-user access cannot be realized. In this case just an individual work with devices is possible and it reduces possibility of collective use of unique equipment. [2].This method can be also applied in a wide set of experiments in different research domains. To effectively control installation in remote access mode, delivery time of IP packet being sent between the client and the server should be reduced by choosing optimal packet length. [2]

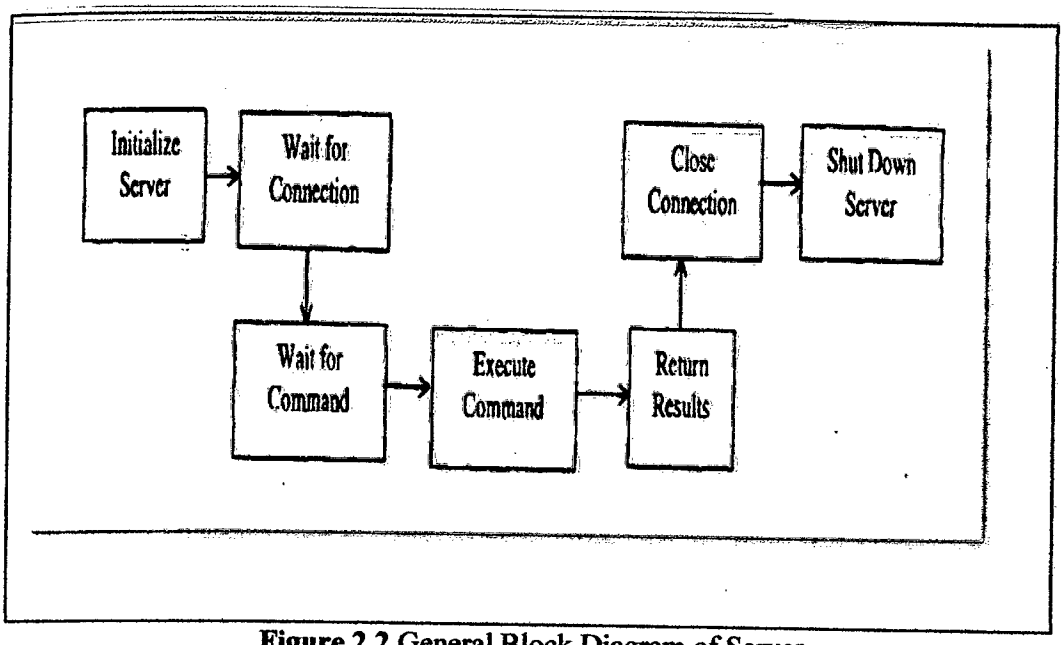

Figure 2.2 General Block Diagram of Server

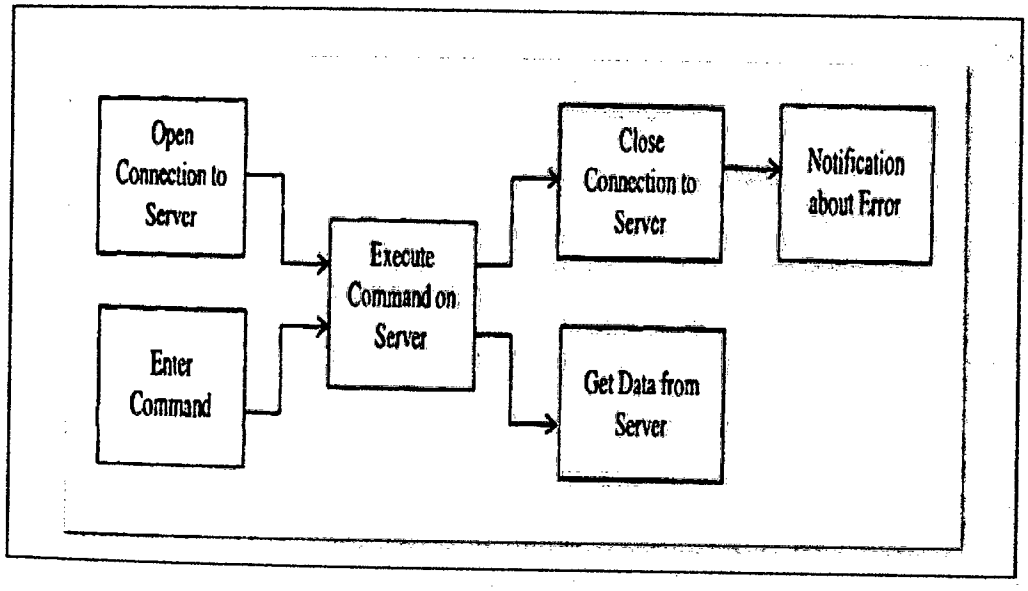

Figure 2.3 General Block Diagram of Client

2.3 Client server and Remote Access

The client and the server model is a concept for describing communications between computing processes that are classified as service consumers (clients) and service providers (servers). [9] Information exchange between clients and servers is strictly through messages, the service request and additional information is placed into a message that is sent to the server. The server's response is similarly another message that is sent back to the client. [5] This is an extremely crucial feature of client/server model.

Remote access is a set of technologies that transparently connects a computer, typically located in an off-site or remote location, to a network. [11] Remote access is typically used by organizations to connect an employee's laptop or home computer to an organization's network to read email or access shared files and by Internet service providers (ISPs) to connect a customer to the Internet. [3]

Users run remote access client software and initiate a connection to a remote access server. The remote access server authenticates users and services sessions until terminated by the user or a network administrator. [3] Remote access also pertaining to communication with a data processing facility from a remote location or facility through a data link..

2.4 Visual Basic 6.0

A tool that will use in this application is Visual Basic 6.0 also considered a relatively easy to learn and use programming language, because of its graphical development features and BASIC heritage. [6] .Visual basic language has become a popular method that is engineered for productively building type-safe and object-oriented applications. In visual basic language reference is providing a property, event, and methods for interacting with the network to which the computer is connected. [10]. It can use the application development in Visual Basic to determine whether a remote computer or host is available. The server can be specified by computer name, or IP address and performing a network operations.

2.5 IC ULN2803

IC ULN2803 consists of octal high voltage, high current Darlington transistor arrays. The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications.[14]

Features:

- Eight Darlingtons with Common Emitter
- Open–collector outputs
- Freewheeling clamp diodes for transient suppression
- Output Current to 500 mA
- Output Voltage to 50 V
- Inputs pinned opposite outputs to simplify board layout

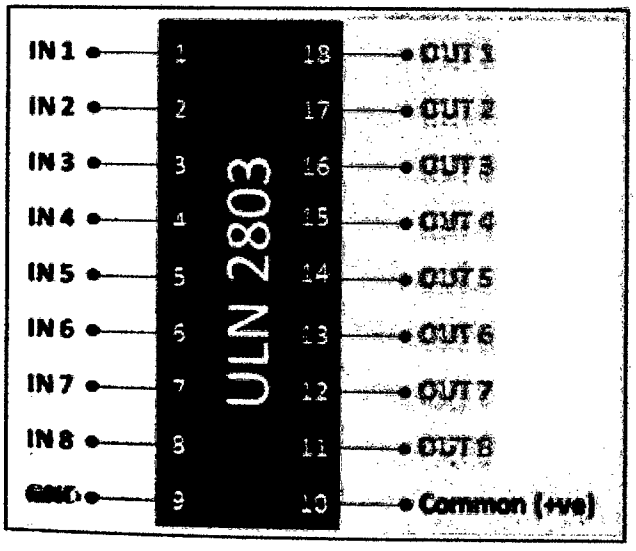

Figure 2.4: IC ULN 2803 Pin out

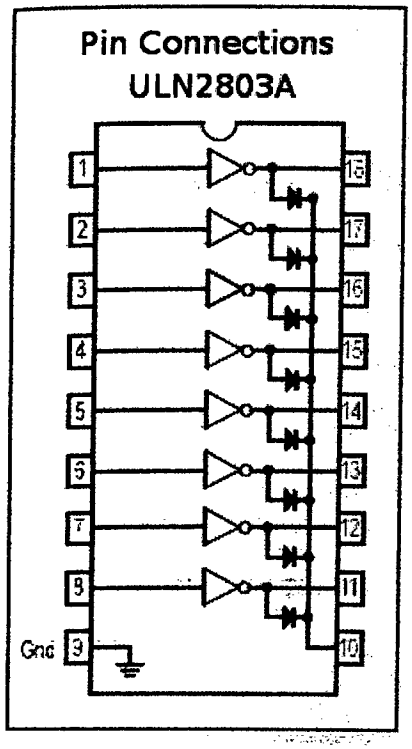

Figure 2.5: Pin connections

Working

The ULN 2803 IC consists of eight NPN Darlington connected transistors (often called a Darlington pair). Darlington pair consists of two bipolar transistors such that the current amplified by the first is amplified further by the second to get a high current gain β or h_{FE} [14]. The figure shown below is one of the eight Darlington pairs of ULN 2803 IC.

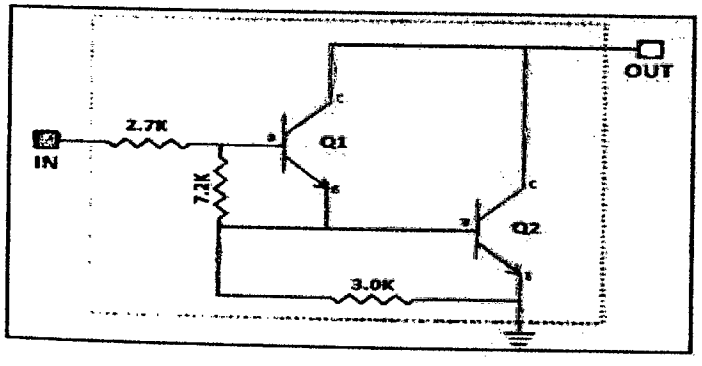

Figure 2.6: NPN Darlington

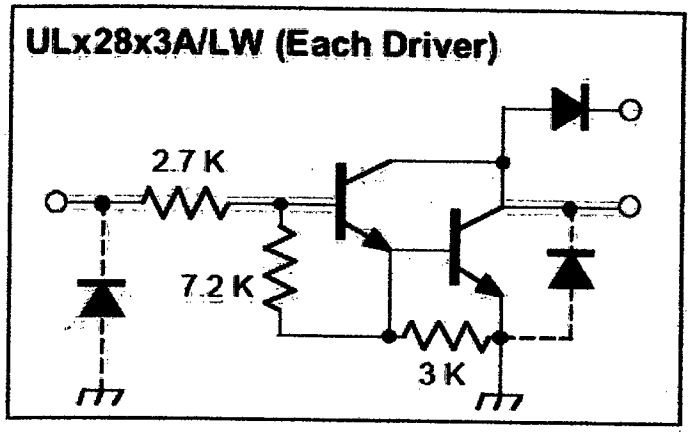

Figure 2.7: Darlington pair

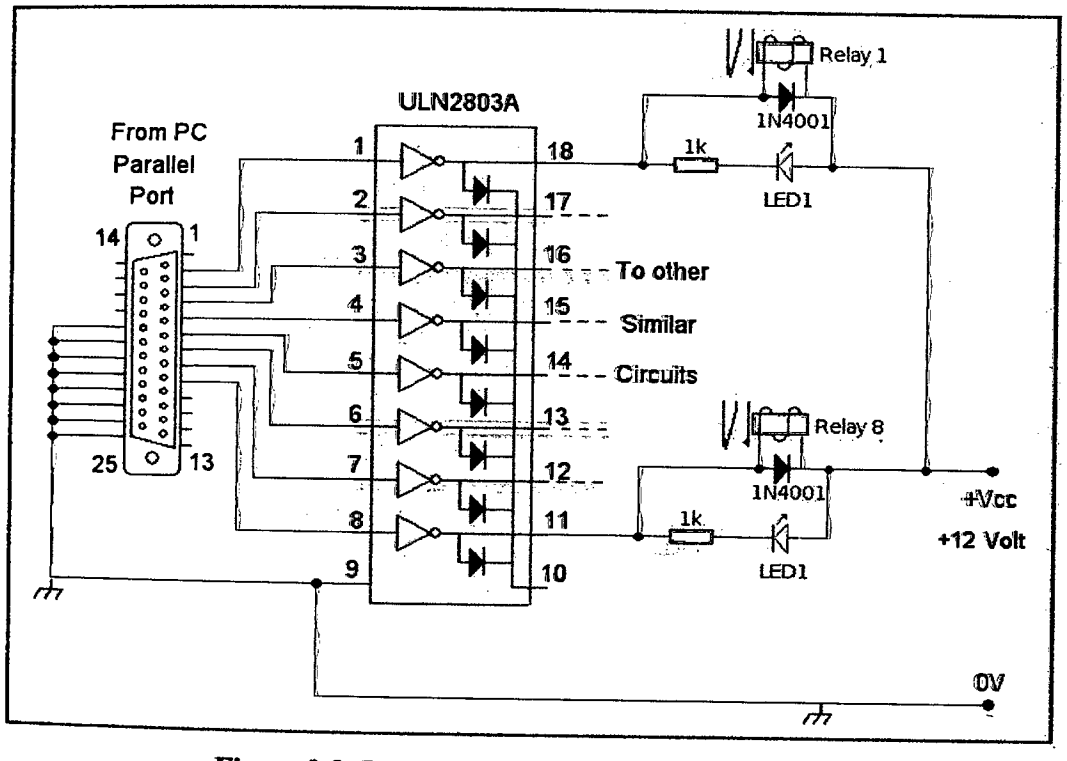

Figure 2.8: Input/output Module Interface Circuit

2.6 Parallel Port

Parallel Port

The parallel port, or printer port, is one of the easiest pieces of hardware available to users for communicating with external circuitry or homemade hardware devices. Most people think that interfacing with an external circuit is hard and never come up with a solution.

2.6.1 Communicating with the Parallel Port

The parallel port usually comes as a 25-pin female port and it is commonly used to connect printers to a computer. Many geeks also use it to connect their own devices to their PCs. There are a few more things to remember when using a PC's Parallel Port. It can load only 2.5mA and ~2.5 volts. It is better to use optocouplers or ULN2803 when interfacing with an external device. [15]

i) Data Register (Pins)

This is the register that allows the user to write values into the port. In simple words, these pins can be used to output a specific value in a data register. These are called output pins. There are altogether 8 output pins available, ranging from D0 to D7. [15]

ii) Status Register (Pins)

These are called input pins or status registers and can hold a value that the outside world gives to the Parallel Port. So, this port acts like a reader and it has 5 pins for inputs. The pin range is S4 to S7.

iii) Control Register (Pins)

This register can be used in both ways: it enables a user to write values to the outside world, as well as read values from the outside world. Pin range is C0 to C3.

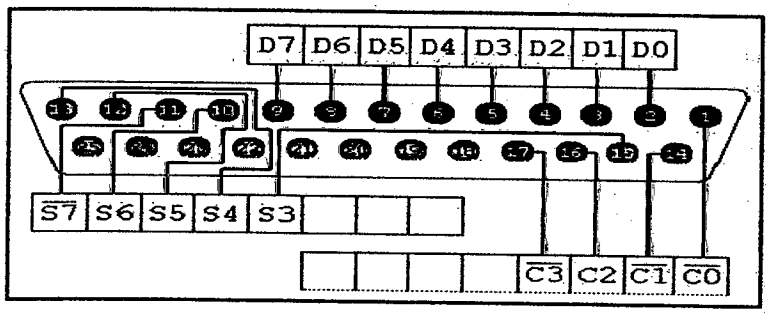

Figure 2.9: Parallel Port (25 pins)

Pin No (DB25)	Signal name	Direction	Register - bit	Inverted
1	nStrobe	Out	Control-0	Yes
2	Data0	In/Out	Data-0	No
3	Data1	In/Out	Data-1	No
4	Data2	In/Out	Data-2	No
5	Data3	In/Out	Data-3	No
6	Data4	In/Out	Data-4	No
7	Data5	In/Out	Data-5	No
8	Data6	In/Out	Data-6	No
9	Data7	In/Out	Data-7	No
10	nAck	In	Status-6	No
11	Busy	In	Status-7	Yes
12	Paper-Out	In	Status-5	No
13	Select	In	Status-4	No
14	Linefeed	Out	Control-1	Yes
15	nError	In	Status-3	No
16	nInitialize	Out	Control-2	No
17	nSelect-Printer	Out	Control-3	Yes
18-25	Ground	-	-	-

Table 2.1: Parallel Port 25 pins